NASA Facts

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

February 7, 2003

NEWS BRIEFING
JOHNSON SPACE CENTER

SPEAKER:

RON DITTEMORE
SHUTTLE PROGRAM MANAGER

TRANSCRIPT:

STAFF: Good afternoon, everybody. Welcome to the Johnson Space Center for today's briefing.

Once again is shuttle program manger Ron Dittemore. Again, he's got a briefing for you today. And we are considering this a briefing, and although it is a press conference, we're going to have a limited time for question and answers with all the NASA centers. So bear with us and we'll try to get to as many as possible.

And with that, I will turn it over to Ron.

DITTEMORE: I was reflecting upon the week. It's been six days since the accident. Tremendously long week for every one of us. And as I was reflecting upon that, I wanted to review a few things that I've told you during the week.

You know, in these types of incidents, the nature of trying to pull everything together leads to some confusion. It leads to misinformation and even some second-guessing, on all of our parts. And there's a certain amount of fluidity in the direction that we may take as we wade through these choppy waters of trying to gather all the relevant information.

Recall that in the beginning I cautioned against jumping to conclusions.

And I think over the past week you have witnessed an inside view of our ups and downs as we attempted to steer a course throughout the week.

Early in the week, we received bursts of data and information, but now there is not a lot of new information for me to report to you. We are now entering a tedious phase of review, re-review, detailed examination of all available data and information. And it's just going to be a painstaking process.

Some of that early information is now being reviewed and some adjustments are expected as we get a better understanding of the pedigree of the information and the data.

The time line has stabilized, but it is still undergoing a few tweaks. And because it's important that we get it right, I'm not able to provide that to you today. I am going to provide you some information that I think will help you understand the relationship between the loss of sensors and some temperature increases over the time frame, and I hope that that will help you get a better feeling of what we may be working on.

I spent the morning visiting the work force that builds the external tank in Michoud, Louisiana. There is just a tremendous amount of activity going on at that location. There are fault trees being developed and there's an extensive testing plan also being developed.

Because of the events of this previous week, and certainly a lot of the conversations that we have had and a lot of the news reports that they have read in that area, both printed and media, there's a certain feeling over there that they are carrying the weight of the world on their shoulders. And I went over to talk to them concerning that weight, and explained to them that they are just one area of investigation and that there are many other branches and roots to the fault tree that we also need to examine.

And I hope they felt better about that. They are not the only issue that we are exploring. They're one of many.

And we appreciate their work. We appreciate their diligence and determination. And they are extremely motivated to try and find the root cause of this accident.

Some information that I received from the Mishap Investigation Team just before I came over: This is the latest report from the field. We have recovered a partial wing leading edge RCC panel, that's reinforced carbon-carbon panel. It's 26 to 27 inches long with 18 inches of wing structure still attached. We are still trying to determine whether or not it is the left or the right wing. And I think we should be able to determine that in the next day or so.

To help you understand the magnitude of some of our problems, there have been over 350 reports of debris outside of Texas and Louisiana, 132 reports in California, of which four are closed, 130 reports in Arizona, of which eight are closed, nine reports in New Mexico, of which four are closed.

Of all those reports there has not been one confirmation of shuttle debris to this time. So we still have a lot of work to do and we're following up on every one of--on each and every one of those reports.

Let me now walk you through some of these slides that I brought with me. I haven't practiced this, so I hope we can do this and make it sensible to you.

Let's have the first slide.

I'm going to walk through a series of cartoons that help you understand the relationship of these temperature sensors and skin sensors in the left wing. These are not engineering drawings by any stretch of the imagination.

I also want to caution you that the times that are identified on these particular slides are very preliminary. In fact, I am not confident that these are the right times at all.

One of the reasons why you're not seeing the time line today is because we don't believe we have the right times established. This was our first burst of data, this was our first run through the information, and we anchored on some of these time frames.

Now, as we are going through and poring over the data in more detail, we're finding that we made some mistakes in identifying where the right points should be. And I've asked the team to go back and review that again, because I do not want to put out any misinformation on the time line.

So even though these times show up in these charts, I want you to understand they're going to change. So when I read the newspaper tomorrow I hope you put some caveats that say these aren't the solid numbers, because they aren't. They are going to change.

Let's go to the next chart.

OK, let me explain to you how to read the chart. You're looking at a top view of the wing. It's the left wing. We've tried to identify the sensors that we have talked about over the last week. You can see the wheel well. There are a number of sensors located in there. And at this point, at the beginning of the time frame that we have studied, which is about 7:52 a.m. Central Standard Time--GMT it's 13:52 to get that correlation--everything in green is a good sensor functioning nominally. An off-nominal sensor is going to show up as red. And then a sensor that just quits working, as we have talked about, it goes off scale low or off scale high, is going to show up as black, as we step through this sequence.

So here we are at 13:52, or 7:52 a.m. in the morning Central Standard Time, approximately seven minutes prior to the loss of signal, where we lost communication and data from the vehicle and the crew.

Let's go the next slide.

Here we are 20 seconds later, and again caution you about the times and the delta time frames: These are all going to change.

I want you to understand the relationship of these sensors, not necessarily the times, but it gives you a feel of what we're trying to review and what we're trying to investigate.

The first indication, left main gear brake line temperature starts to rise. A two-degree-per-minute rise is not significant, so we are not sure whether this is the real start of any significant event, but we're pointing that out today.

First indication as it shows red on the view graph.

Next chart.

Left main gear brake line temperature A starts to rise.

I should point out also, as you look at the chart, I don't know if you can see that well, but there is, kind of, an orange or yellow cabling that connects several of the green sensors from the wheel well down into the back part of the wing, or the trailing edge of the wing. The way to think about that is it's all in one common wire bundle, or a set of bundles. There's a blue bundle, or wire bundle, at the trailing edge of the wing, that's a separate wire bundle.

So that's going to become important to us as we think about common points of where there could be some heat source that could, at one location, disrupt several sensors.

Let's go to the next chart.

This is the third indication: The left main gear brake line temperature C starts to rise, again in the wheel well.

The next chart.

First indication of a skin temperature going off-line; you could see it's on the left inboard elevon. This is one that just quits working.

Next chart.

Hydraulic system three left outboard elevon actuator return line temperature goes off-line, stops working, stops registering as functional.

Next chart.

Hydraulic system one left inboard elevon actuator return line temperature becomes non-functional.

Next chart.

Hydraulic system one left outboard elevon actuator return line temperature, again non-functional. Hydraulic system two left inboard elevon actuator return line temp, again non-functional.

So you can see we're trying to develop an understanding of a pattern and whether or not there is some common point that is preventing these sensors from functioning. And we're looking certainly at the wiring and the routing of the cables and the time line.

If you looked at the top of the chart, you can see that we're just running along the time line in the sequence of events.

Next chart.

The left main gear brake line temperature B. We start to see it rise, so now we're back into the wheel well, again.

The next chart.

Mid-fuselage left body line temperature. Now, this one's interesting because we don't believe it's connected in any of the wire bundles to what's in the elevon or what's in the wheel well. And so it's odd to us that this appears suddenly, but it begins to rise. And again, this is on the side wall of the orbiter, back in this location.

Not on the wing, on the side wall. Whether that's important or not, we don't know. So that's part of the investigation.

Next chart.

Left main gear strut actuator temperature begins to rise.

Next chart.

Left main gear up-lock actuator unlock line temperature begins to rise.

OK, here we are at approximately 7:54 a.m. Central Standard Time, no reports from the crew, no reports from our flight control teams. Everything is operating and functioning nominally in all of our systems. All we are seeing is some of these sensors dropping off-line in a sequence of events over a period of time.

Next chart.

System three left-hand forward brake switch valve return line temperature starts to rise back in the wheel well.

Next, main landing gear left outboard wheel temperature goes off-line.

Remember I explained to you previously that we had sensors on both of the tires and the wheel well. In a sequence of time, you'll see that they all didn't go off-line or quit functioning at the same time, which leads us to believe that we didn't lose the tire. The tire didn't deflate. We didn't have some event happening. But what it means, we don't know yet.

Let's go to the next chart.

Left upper wing skin temperature, left lower wing skin temperature goes off-line.

So you can see it's connected to the cabling that is common to many other sensors.

Next chart: System two left hand aft brake switch value return temperature starts an off-nominal temperature rise.

And when I say start, again, I'll go back to what I mentioned previously in this briefing as, we're not sure whether these start times really mean anything to us. This may be such a gradual change that the start times I'm talking about, that is not an off-nominal event.

As we go back and examine the data, we may find that it was relatively flat in this time frame. And then, two or three minutes later, it took a significant swing upward in temperature. And that's why I say I'm not sure we have the right starting point. I hope you're getting the idea of what we're trying to look at.

Next chart's the main landing gear left hand outboard tire pressure number one goes off-line, nonfunctional.

Next chart: Main landing gear left hand inboard tire pressure goes off-line. So you can see the sequence of how these things are starting to add up.

Here we are at 7:58--approximately--a.m. And so, we're getting near to the time when we lost contact with the crew and the vehicle.

Next chart's the main landing gear left hand inboard wheel temperature goes off-line.

Next chart: Main landing gear, left hand outboard tire pressure goes off-line.

Next chart: Main landing gear left hand inboard tire pressure number two stops working.

I believe that's the last chart.

So that's the sequence of events as far as all the data that I've tried to explain to you over the last week. I hope that was informative to you. It certainly is helping us understand what's happening at what times. What it means yet is going to take us some time to figure that out.

Be cautious about your own conclusions.

We continue to look at photographic evidence. As I mentioned to you yesterday, it is challenging and difficult and proceeding slowly.

We did receive a photo from the Air Force optical range at Kirtland Air Force Base in New Mexico. We can show that photo if we have it. I'm aware that there may be some of you that are saying this photo is revealing. We have looked at it. We had it during the week. And it's not tremendously revealing to us yet.

I'm not an expert in looking at these types of photos, and so we are asking experts to do an evaluation of the photo to see if there's anything in this particular photo that would help us understand if there was anything wrong on the left wing.

Here is the right wing, OK, and the left wing down at the bottom of the photograph. Now, it looks a little more distorted on this large screen than it is in the actual photograph, but the nature of the photograph, because of the resolution, has a little choppiness to the wing leading edge. Some people are looking at this area on the bottom area of the photograph and which would be the wing leading edge, and they're trying to draw some conclusions from that area.

It's not clear to me that there's something there yet. If your eye is sharp, maybe you can draw a conclusion. I can't.

And so we're asking the experts in the field to look at this particular photograph. We have been doing that over the last several days. And it's just part of our suite of information that we're going to continue to pore over.

Again, I hope that is informative to you to help you understand that these things are not black and white, and you can get a particular photograph and someone might draw an immediate conclusion, and to us, we don't draw the same conclusions.

I'm aware that there may be some reports and media reports that say this photograph is tremendously important. It's not clear to me that it reveals anything significant at this point.

So again, I'd be cautious about what all this information means to you. We've got a long way to go. And we have to add up all the different photographs and look at every piece of information and catalogue it properly until we get the right data set.

All by itself, I don't think it's very revealing. I'm hopeful that as the experts look at these photographs, maybe they can tell us something about the state of the vehicle.

Now, as this week closes, we need to recognize that we have begun to open a new chapter in this investigation process. The chapter of this week is closing. And it's been a frustrating week. The emotion has run high. The disappointment cannot be overstated. We've gone through these memorials. It's been difficult for our team, but it's been beneficial because of the beginning of a healing process.

But here we are today, a week later--almost a week later, and we are focused on solving the problem.

An investigation board has arrived in Houston, and we've spent a lot of time with them, understanding our roles and responsibilities and transitioning the leadership and handing over the reins of this investigation to that board. Our support to this board is absolutely critical, and we have pledged our unwavering support to them. If there's anything they need, we will provide it. And we are working night and day to help them, which will--to help them on a very difficult task over the coming weeks and months.

So again, let me say that we have a tremendous amount of work to do.

The state of the team, if I were to report on their well-being, I'm extremely proud of them. They have risen to the occasion. They have overcome their own personal difficulties and are engaged in trying to find what went wrong. Across the country, East Coast, West Coast, everywhere we look, the professionalism is outstanding in the face of these trials and challenges that we have experienced.

Also, as we close this week, I believe the chapter closes on the way we are handling these press conferences. We have been, in my opinion, as open as we can with you. We have expressed some of our feelings.

We have revealed to you data that we don't even understand. We've shown you information that we know now may have been wrong, and we are going to have to adjust it.

So you have been looking over our shoulder, so to speak, watching us go through this process. Typically, you never see this process. And whenever we have an investigation or any type of technical problem, this is pretty much typical.

It is met with information that comes to your knowledge. Typically, the information is somewhat ragged and unreliable, and over time it gets better and we find ourselves sometimes contradicting ourselves and moving in different directions because of what the data's trying to tell us. It changes day by day, sometimes hour by hour. And so as you describe it we may change our tune, we may change our direction, we may reverse our course.

I think all those are acceptable descriptions of the process, as long as we are true to ourselves in trying to be rigorous about what the information means and what we need to do about solving the puzzle.

As for me, I don't believe you'll need me up here any time soon to talk to you about the information and the data. I think that chapter is closing.

As we have turned over the reins of leadership on this investigation to the investigation board, they will now--this investigation board, will now take over the handling of the briefings to the media and to the public. And we'll let you know the briefing schedule.

One final comment before we open it up for questions: The purpose--one major purpose for us being so open and honest with you in this public setting, not only to let you follow along with us and to let the public follow along and try to understand what we're going through, but also to let the members of our team from across the country tune in and receive the latest information at our disposal, so whether they're on the East Coast or the West Coast they have a feeling for what is going on in a very tragic situation.

And the best thing for them is to try and understand what the events are from day to day and what information is being gathered. Even if it's preliminary or premature to report, the best thing we can do for them is to report it. It's the healthiest thing for my team.

And I hope you understand that also. I think it's been healthy for you to understand it. And I have read some of your articles and reports, I think most of you have understood it and got the facts right. And I appreciate the way you've handled this part of the investigation so far.

And so with that, I'll try to answer your questions to the best of my ability.

QUESTION: Can you explain clearly why you think those wiring bundles might prove to later be important?

DITTEMORE: Well, if you were looking for one common event and you saw a number of different parameters in many different locations all being affected by what we think may one common event, maybe the wire bundles is a connecting link. And so, we need to examine that.

I don't know whether it's one event or two events. I don't know if it's cause or effect. We have to work through those types of scenarios and the questions that will certainly be asked to understand what this information really means.

QUESTION: From what you've said in the briefing so far, it sounds like although the jets were trying to compensate for some drag on the left side, the shuttle was still in roughly the right orientation as it descended. So what I'm wondering is, as you think about this now do you think it's more likely that, A, the growing drag was enough to suddenly send the ship out of control and that made it break up; or, B, the ship suddenly broke up because of some other issue, like hot plasma melting the wing or something else?

DITTEMORE: I wish I knew the answer to that question.

What's interesting, as we have looked at some of the videos that you have provided to us, is that it certainly appears that something is happening earlier in the time frame, in the sequence over Arizona/New Mexico. We need to go examine the films and try to understand what that's trying to tell us.

But we do not see anything manifested in the data or the flying qualities of the vehicle, which is very interesting. We don't see any real temperature excursions. We don't see any systems anomalies. We don't see any handling quality dispersions, other than what I've described to you with what seems to be an indication of increasing drag on the left wing.

That's all the information we have. We're hopeful that maybe we'll get other clues, but we'll have to wait for those clues to come forward and try to piece the puzzle together.

QUESTION: Ron, on the picture you showed--which I agree with you, it's difficult to make out--it does look a little bit asymmetrical. I'm assuming that's a negative photograph.

DITTEMORE: I think it needs to be understood, you know, the angle at which the photograph was taken. All that needs to be factored in.

QUESTION: (OFF-MIKE) had any idea about the geometry?

DITTEMORE: I don't yet. But that--you're exactly right. That's exactly the questions we have when we examine the photo. You'll have to understand where the location was to take the photograph, what was the angle, and how did it reflect this spot as far as the planar view of the vehicle itself.

QUESTION: And the only other thing that was clear, to my eye anyway and I'm sure yours too, it did look like there was some kind of plume trailing the left wing. I'm assuming that we're expecting that to be some sort of thermal event. I mean, that doesn't look...

DITTEMORE: It does look--just if you looked at the picture with no technical understanding, it does look like there's something a little different about the left-hand side behind the wing than the right-hand side. And you can see that in this area right here. That does look a little different to us and that's an area of investigation.

QUESTION: Ron, I wanted to continue along that line. You said some people mentioned that to them it looked a little odd. How did they verbalize that? What did you hear? Did you hear anyone use the word ``jagged'' among the people who have looked at this from the interior? And...

DITTEMORE: Well...

QUESTION: And I'm just wondering if indeed there is some--something is jagged there or deformed, does it take us back to launch day when--you know, does that give more emphasis to the foam issue?

DITTEMORE: I think looking at the film with our untrained eye, someone might almost interpret that there is something there. I can't tell. I look at it and I say, ``Well, I don't know if that's an artifact of the photograph, or is the photograph really trying to reveal something?'' So I have left it to the experts to analyze the photograph and come back and give me their expert opinion.

And I forgot the second part of your question.

QUESTION: If indeed there is something wrong there...

DITTEMORE: It does not indicate whether an event occurred on launch day or on orbit or even during entry. You cannot tell from that photograph. If there is any damage, you do not know when it occurred.

QUESTION: Ron, to return back to an issue from mid-week that you addressed, General Kostelnik addressed also about what the crew knew, when it knew it, you said that the crew was made aware when the engineers knew of the vent with the foam at lift-off. I'm curious as to whether you can tell us anything more specifically about how the crew was told, whether the crew had any questions about that event at lift-off, how the communication took place, whether by voice or e-mail? Any specificity that you can add to that issue.

DITTEMORE: At this time I don't recall exactly the sequence of events. Typically when we would alert the crew, we'd do it by voice, and we would follow it up with an e-mail or a message, and perhaps in the message give them a little bit more detail so that they can read it.

Just like you and I would, we could have a phone conversation, followed up by anything documented is a lot easier, because then the crew, at their leisure, in their off time, can read the information again and discuss it on orbit.

So I'm almost positive that's what happened.

But we're going to have to get those details to make sure, for certainty, how all of that sequenced together. And we have it; we could get it to you.

QUESTION: (OFF-MIKE)

DITTEMORE: Because I wasn't there, I can't answer that firsthand, and it would be a secondary comment. So let me have the opportunity it get the people that were there firsthand to give you that answer.

QUESTION: Do you know when the wheel well was secured prior to launch, and can you rule out that there was anything left behind?

DITTEMORE: It secured prior to rolling over from the orbiter processing facility to the Vertical Assembly Building. Obviously, the wheels have to be up and the gear locked in place and the door closed before you mate it to the external tank.

In that time frame was your last inspection period also. And there are very rigid inspections and criteria that must be met before we pass that the landing gear is properly in its position within the wheel well and that the door itself, the main landing gear door, is up and latched properly.

QUESTION: Ron, as you mentioned at the top of the briefing, there's been a little confusion, mainly on our part, I guess, to some extent, on what the various theories have been and the role of the insulation and the foam impact in all of this.

And I was wondering, now that we're a week into the investigation, can you characterize for us what role, if any, you think the foam might have had? Are you discounting it as any sort of a major player in this, or do you think that it's still potentially something that is a major culprit here? How are you focusing on this as you move ahead?

DITTEMORE: We're focusing on the foam loss off the external tank and the impact to the wing as a potential contributor to the cause of the loss of the vehicle.

I mentioned to you earlier in the week why I thought--to help you understand why I thought that it may not be the most likeliest contributor, because we have had it in the past, and our experience has shown that it has never been a contributor.

But that has not stopped us from keeping in our job jar of things to go investigate.

In fact, if you saw the activity in the Michoud facility you would be amazed at how much work is going on to try and solve just that very point. Tremendous number of engineers working around the clock to develop fault trees and testing plans.

It is our intention to test the foam and impact to a tile to prove that it either wasn't--that it either was a contributor or it wasn't. So we're not going to let it lay aside, we're not going to ignore it, we're going to be proactive and prove, by data and evidence, that it either was or was not a player, along with all the other fault tree branches and roots in other systems.

So it's still in our job jar, those people have been working all week. And I don't think we've reversed direction on our activity. We may have--you may have witnessed some of our emphasis up and down through the week, but the people in MAF wouldn't know that we have changed our emphasis. They have been working around the clock since Saturday.

QUESTION: I know experts are analyzing the photos. Do you know if they're going to be looking at previous flight photos--comparing, using any of the ...

DITTEMORE: Oh, absolutely right. The way we understand whether something is not right, or off-nominal, is to compare it with another photograph, maybe in another mission.

For instance, the photograph that you saw from the New Mexico, Kirtland Air Force Base area, we would like to find another photograph that is similar to it on another mission so that we can compare the two and that's the best way to see if there's something that's misaligned, or something that's not right.

So we're going to go back to our data bases in our experience and try to get a comparison of something that we know is absolutely pristine and compare it with this flight and this mission and see if there's anything that pokes out or alerts us to a change in configuration or some type of off-nominal event.

QUESTION: I want to go back to the sensors. It seems like the story they're telling are, sort of, like the falling crumbs along the trail in the old fairy tale that we hear when we were young, but to your practiced eye where is that trail leading in relation to the geography of the wing?

DITTEMORE: I have been very careful through this entire week not to draw conclusions. It's a very tempting thing to do. You want to draw conclusions as quick as you can based on the information.

And I know you--many of you have succumbed to that temptation also.

But you can't do that. We have been in this business long enough to know that you go down that merry path of making a judgment or a rush to judgment, and you will be fooled.

You need to go through the process. You need to gather the data. You need to correlate all the data, the time frames, the evidence, the photos, the way the system behaved. And you need to do it under the scrutiny of a microscope for you to get the right answer.

And even though it's a temptation for us to try to make a judgment, our experience has shown that you should not. And we will not until we get all the data together and are able to come tell you what we believe this information represents as far as a root cause.

QUESTION: I have a question about the, sort of, overall methodology that you're using, and you've talked a lot about this fault tree analysis and how that works. Can you explain a little bit, in that approach to the problem, how you deal with interrelationships between different components or different phenomena or different things that may have happened, different parts of that fault tree that may affect each other in some way that amplifies the effect or produces some kind of a feedback loop or something like that, so that what you get is a result that's greater than or different than the two things looked at in isolation? How do you treat that as you're looking through a fault tree analysis?

And more broadly, what's your thinking at this point about--what's your feeling at this point about a single cause versus some combination of causes that play off each other?

DITTEMORE: Well, this fault tree analysis technique that we use is a very effective technique at making sure you don't overlook any possible cause that may lead to resolution of the problem.

And in it dives down into the system to a very great extent.

For instance, the external tank fault tree, in pages, is probably about half an inch thick. So the number of blocks that you have to go through is hundreds, if not a thousand or more. And that's just the external tank.

And we have asked the main engine, the solid rocket booster, the solid motor and the orbiter to produce fault trees also. And so you can see--you take the external tank. You multiple it by at least four or five, and that's the magnitude or the size of the fault tree for the accident that we're trying to solve.

And then you look at it from an integrated level--just not from a stovepipe, one-system look. You have to look at it from, ``Well, is it a combination, or were there multiple effects or events?'' and you have to look at the overall aspect of the fault tree.

That's about as simple as I can make it today. It's not that simple, and it takes a lot of people to put these things together. And the fault trees, in actuality, change constantly as you get smarter and smarter about the system, and you ask yourself questions--"What if," ``What if,"--and you answer it with a ``then'' or another piece of information and you add it to your fault tree.

So it's an ever-changing type of process until you get to a document that you believe represents the total area that you need to consider, and then you--can't think of the right word right now--but you painstakingly close out every root, every branch to get to the right solution.

QUESTION: Ron, I know you're kicking around an awful lot of theories right now, but I wondered if you might talk about static electricity generated in reentry and maybe other electrical events that might affect the carbon-carbon on the wings. Can an electrical event damage that? And is that a theory you might be looking at?

DITTEMORE: I really have no idea whether we had any static electricity, whether or not we had any electrical discharge. I don't know, and we are asking experts in the field of atmospheric science if those types of events are even possible, especially at the altitudes that we were flying: greater than 200,000 feet.

And so we're going to need to ask that question to the experts and let them feed us some information, because at this point, we're at a loss as far as whether a phenomenon exists that represents some type of discharge at that altitude, especially in the relatively clear skies that we were flying on last Saturday.

QUESTION: I'm wondering, can you tell me when and where will the foam impact test be conducted? And will there be other physical tests of the foam or other things that you are going to be doing in the next two weeks, just to help give a time frame of what kind of tests you're looking at?

DITTEMORE: Well, the activity is being led by the engineers at the Marshall Space Flight Center. They're located at the scene and where we manufacture the tanks, which is in Michoud, Louisiana. I don't have the specifics because I don't think they have the specifics yet.

They've spent all week just generating the fault tree. They are starting to formulate the plans for testing. I suspect that the testing will occur in several different place, and so that we can do parallel testing, do

multiple testing at the same time, and thereby cut down the amount of time it takes to complete all the testing.

QUESTION: Do you have a sense of whether the shuttle went out of control due to an aerodynamic or other problem and then broke up, or was the ship flying well when it broke up?

DITTEMORE: At the point where we lost data and lost voice communication with the crew, it was not apparent to us that we were out of control. The data indicated that we--the flight control system was still trying to correct whatever drag dispersion we had. And it was able at this point--from a flight control standpoint, it was still able to maintain control.

But as I said yesterday, it was losing the battle over time because the rates of the dispersion, if you want to think about it that way, the dispersion seemed to be overcoming the muscle that was available at the time to counter it.

And even though we were still flying straight and in a general attitude that we desired, we can see that the aero surfaces were continuing to increase in their magnitude to counter the drag. The jets were firing, again to counter the drag. And when we lost data, they were still holding control of the vehicle.

So that's as much as I can tell you right now. We still appear to be in an acceptable attitude for flying the vehicle at the point where we lost voice and data.

QUESTION: Is the sensor map you just went through with us earlier showing all the sensors including--I mean, those, if there are any, in the wing's leading edge?

DITTEMORE: I'm not sure that in this cartoon we included every sensor that was available. This is a cartoon that we put together to help us understand the sequence of events, given the data that we understand loss of information or loss of the sensor working versus temperature rising over time.

I'll have to check on that stuff; I'm not positive of that.

And it's doubtful that we--I would believe it's doubtful that we captured all the sensors. I think this is our cartoon of only the sensors that we've been talking about over the last week.

QUESTION: When will you start moving the debris here? And when and where will the briefings be held by the board?

DITTEMORE: Some of the debris is already headed to KSC.

I'm aware that we had a report that we retrieved a turbo pump--one of the main engine turbo pumps. And I think the report identified that they were just going to wrap that up and transport it to KSC.

Most of the debris is going to Barksdale Air Force Base where it is being catalogued, examined, photographed, bagged, tagged and then packaged to be removed and relocated to the Kennedy Space Center.

And that will be happening as a process. In other words, we don't need all the debris to be collected and staged at Barksdale Air Force Base before we move it. It will be received, go through this process I just explained and then relocated.

Once at KSC, then we'll go through the laborious task of identifying the piece and trying to reconstruct the vehicle.

QUESTION: Briefings, please? Do you know when the briefings will start, Ron?

DITTEMORE: I'm going to let Kyle (ph) give you the schedule. I'm not aware of the briefing schedule at this point.

QUESTION: Being that NASA will sometimes take spare parts from orbiters and put them in another as not to delay missions, and that Columbia's loss eliminates a quarter of the fleet, is there a possibility that one of the remaining three orbiters will have to be gutted to keep the other two flying?

DITTEMORE: There's no possibility of that. We have no plans to make one of the three remaining vehicles a hanger queen in any sense of the imagination.

We have sufficient spares to keep three remaining vehicles flying for as long as the government, this nation, desires these vehicles to fly.

And we are continuing to invest in making sure we have sufficient spares and stores available to keep these vehicles in good flying shape. And where we see there are deficiencies, then we will expend resources to make sure we change those weaknesses to strengths.

QUESTION: At a prior briefing, Ron, you gave us a time line of your efforts to work the foam issue. And my question concerns that time line that you gave us. And basically you said that the mission management team had two meetings at which this came up, and I believe one was January 24th, and the other one was January 27th.

And I wanted to ask you what--in between those meetings, what happened? Did you send the engineers back to do some additional work? Were there some unresolved questions at the first meeting, and if so what were they and how were they resolved?

DITTEMORE: Let me answer that question by really describing the process of how the mission management team works during a flight in the control center environment.

The mission management team meets periodically. It does not meet every day. It meets as a function of important milestones or events during the flight. So it's not something that is every day as far as gathering the entire mission management team together to discuss what may or may not be happening in a flight.

It will also meet as required to discuss technical issues.

Now what happens in between when they're not meeting? The people involved in the management team are responsible to be knowledgeable about what is happening in the flight, whether there's a technical issue or whether or not there are important critical events that are going to occur and whether their support is required.

So even though I talk to you about a time line of events where we have teams that were off analyzing information concerning the debris and then reporting to the mission management team on two occasions, it is significantly more than that when you talk about how the information is, in practice, transmitted to the management team.

They are in the control center many times during the flight without holding a mission management team meeting. And when they're there, they are talking to the engineering teams, they are talking to the flight control teams, and they are transferring information.

``What is critical? What analysis are we performing? What are the conclusions? What are the assumptions?'' These are the typical types of things that are being discussed outside of a formal mission management team meeting.

Prior to a flight, to put this in perspective, when we get ready to hold a flight readiness review, it's a very methodical process over a period of a month and weeks to get ready to support a flight readiness review.

In the time frame of a flight, because the flight is only 10 or 11 days long, you don't have the same opportunity to utilize this time-consuming, very methodical process.

So we use this mission management team approach, where information is exchanged formally and informally, both to upper management, flight control, astronauts, safety, quality, engineering.

And so as you see a time line and you say, ``Well, they only held five meetings; they weren't very serious,'' that is extremely misrepresenting what happens in a flight.

Numerous conversations occur outside of the mission management team so that we are all aware of the technical issues, we are all aware of the engineering challenges, we are all aware of the analysis. We're all aware of the assumptions. We talk one to another, to our technical experts outside the meeting to get a feeling on whether or not the problem represents a concern or if it's in family, within our data base. And those types of discussions help us determine whether we need to call in a bigger team with more formal briefings.

And so you need to understand that it is largely the flight environment where we do this types of activities where it's a constant type of information exchange.

Don't get locked into how many meetings we held. Don't get locked into how long we talked about it at a particular meeting. That's irrelevant.

What's important is, did we discuss the topic? Were we knowledgeable about the topic? Did we talk to the right technical experts? Did we complete the appropriate analysis? Did we agree on the results?

And in this case, that process was followed. And as I reported earlier, all those things I just mentioned, you can put a check in the square, those things happened.

And it doesn't matter to me how much time we spent in a particular meeting, because success is not how long the meeting is. Success is how relevant the data is, how good the analysis is and how adequate the conclusions. And if you test them properly and you have the right checks and balances that are--this healthy tension between operations and engineering and safety and analysis, if you have the right checks and balances, you've got the right process in place.

And we had the right process in place. We had the right healthy tension. We called on the proper experts. We were knowledgeable about whether it was in family and whether it was within our experience base. All of those things happened.

And I'm very satisfied that the process was followed within the context of the flight mission management team.

QUESTION: Could you tell us more detail about the latest debris that was found near Fort Worth? When was that found and where? And can you explain a little more why you can't tell whether it's the left wing or the right wing?

DITTEMORE: Well, that's fairly easy for me to answer because I receive a phone call and it tells me, ``We found a piece of debris.'' Doesn't tell me where necessarily. Tells me what it is. Doesn't tell me whether it's left wing or right wing. It tells me we're analyzing whether it is left or right. It tells me approximately when I should have some more information.

And so, I get the essential points, the essential information. And I let the team continue to evolve so that they work to get the correct data from the particular piece of debris.

If I demand too much information too early, I'm just going to get a first report that is not going to be very reliable. I let the team work it. They give me the essential information as soon as they know that it's factual. And then, I rely upon them to continue to work. And when they have something that they know is factual, they'll call me back and let me know.

What I know today about that particular wing leading edge is that we have it. It was found--I don't even know where it was found, but I think it was staged at the Carswell Air Force Base location. So that's, I'm assuming, Dallas-Fort Worth area. I gave you the parameters that were related to me and what I have related to you is all I know. And that when we get more information, we'll pass that on.

QUESTION: Over the years NASA has beefed-up the thermal protection of the shuttle's trailing edges, including the elevon and elevon cove. What were the issues with plasma flow that caused you to upgrade the thermal protection there?

DITTEMORE: I'm not really sure. I'd have to go back and research what upgrades you're talking about and go back in history, because I don't recall, and try to refresh my mind were there some particular environments that we didn't think we had sufficient margin and that we wanted to put in a greater level of margin by changing a configuration.

I can't answer the question other than to say I don't know at this time. But we can certainly research that and get you the history behind it.

QUESTION: There's one remaining lightweight tank, the companion to one that was on Columbia. Are you going to use that as an active test article and put it through some trials down there in Louisiana, or what are you going to do with that?

DITTEMORE: We have two lightweight tanks--we had two lightweight tanks. One was ET-93 and that was the tank that we flew on STS-107. We have its sister tank, ET-94, it's a lightweight tank also. It was manufactured and constructed in the same time frame as ET-93, but just months apart. So they're twins of a sort.

And ET-94 is sitting in the facility at Michoud, Louisiana. And when I was there today, it is impounded. I reviewed it. I looked at it. It is there for us to use if we need it. But it certainly is a sister ship manufactured at the same time as ET-93, so that if there were any questions about ET-93 and its pedigree, perhaps we could utilize ET-94 to answer those questions. So that's something that we're considering depending on the questions that come up.

QUESTION: You mention your trip to Michoud today and the pressure the workers were feeling there. Since Marshall manages the lift-off programs, do you get that same sense here at Marshall? And are you planning a visit here in the near future?

DITTEMORE: I would assume that there is a certain amount of pressure and stress at every location. It's true here in Houston. I think it was certainly increased in Louisiana just because of the rhetoric during the week, the reports in the media and even some of the things that I have commented about.

It is my intention to go to each one of the sites in the near future and talk to the work force, keep them abreast of what's happening, answer their questions to the best of my ability, and let them understand what we are doing and assure them that we will keep them informed of what's happening.

I'm going to continue to ask them to process vehicles. I'm going to continue to ask them to do work in a lot of other areas.

Not everybody in the program will be involved in the investigation. So there's still many different areas that the program is involved in that will require their attention. But for them to be informed is very important to me.

QUESTION: Ron, just curious: There's been a lot of things written here in the local media and a lot of talk about something you mentioned yesterday, and that is this photograph taken by an amateur astronomer, given to Jernigan in Ames and then sent to Houston that shows some sort of anomaly or bolt of something somewhere here over California. And the writings and the things that have been mentioned have been things like sprites, blue jets or elves that happen at that level of atmosphere.

Just wondering if you had a chance to take a look at that photo of if you're still looking at those things to compile information about that type of investigation.

DITTEMORE: I have seen the photo. We have sent the photo off to be examined, to verify its validity. We have not completed that activity yet. We have invited some atmospheric scientists to come to the Johnson Space Center to help us understand is there any phenomena that they know of that might exist in the upper atmosphere.

DITTEMORE: So we're working a couple of activities in parallel, at the same time, and trying to understand if there's any merit to this particular photograph. Still in work.

QUESTION: You had mentioned several times that you are reviewing the possibility of atmospheric, electromagnetic phenomena. Is there anything in the shuttle telemetry compared with past missions that would suggest that it encountered any type of electromagnetic phenomena during reentry? Also could you specify the four closed debris findings in California?

DITTEMORE: There's nothing in the data stream and the information that I have seen to date that would cause anything--any concern on our part, other than what I have talked to you about.

As far as the debris in California, I don't have any knowledge of it. I haven't received those particular reports other than the particular metrics that I reported to you.

QUESTION: Could you please tell us where exactly the wing was found and by who?

DITTEMORE: I think I addressed that earlier. I don't know who exactly found it. I don't know if it was a member of our public that is helping us search for debris and then notified the authorities. I don't know that information. And I don't know the exact location of where it was found, other than the general area that it was reported to be at Carswell Air Force Base.

QUESTION: What is the true significance of this wing find in the Dallas-Fort Worth area? And is there any significance of the fact that this is a major structure that is so far back towards the west from the rest of the major debris is?

And another thing too on security, with the security alert being elevated, does that mean that we have any kind of security problems within the debris area?

DITTEMORE: I have been up here a long time, and you are taxing my ability to remember everything that you ask me. So I'll take a stab at it.

In fact, since I listened to you, I've forgotten the entire question.

(LAUGHTER)

I imagine this is a function of my poor abilities to remember. So you're--take a stab at it again. But condense it down into what you would like me to answer, because you keep stringing these questions my limited ability is going to forget.

QUESTION: I think all of us have a limited ability right now, I apologize for that.

The significance of the find and the fact that it's so far west from where the rest of the debris is? Does that tell you anything or could that tell you anything as to the cause of the crash?

DITTEMORE: OK, all right, I got that part.

It doesn't yet. I don't know if it's left wing or right wing. If it's right wing, maybe that's not as significant. If it's left wing, I think that would be more significant. Certainly we're more interested in the left wing. If it's leading edge material, which it was reported to be, at what location in the wing leading edge is it? Is it in the area that we thought we had the most emphasis? And that would be in the wing leading edge area of seven through 10. If it's inbound or outbound or inward or outward of that location? I don't know.

So the fact that it was in the Carswell area; I don't know if that's significant or not either. That's just this first report. And the process of investigation, examining where debris fell and where it was gathered is going to be very important as far as piecing the puzzle together about what happened at altitude.

STAFF: OK, that's all the questions we have time for.

And, of course, a couple of programming notes. The usual slide we'll put up on NASA TV for you that we put up every day. And that is for those that can offer help, that may have some photos to call the Emergency Operations Center. You see that on the screen. I won't run through that again. There is an e-mail address there. And there's also a physical mailing address.

So please help us and get the word out to folks that--especially across the weekend who may be out and about and see something that they think might be of benefit to the investigation. So pass that along for us.

Let's see, the slides that Ron showed you during the briefing are on the space flight--human space flight web site. And you see that there. It will magically appear on the NASA TV feed. So spaceflight.nasa.gov. The slides will be posted there along I think with the photo that Ron showed you as well.

Following this, immediately we'll show a short two-minute video file, basically some B roll of some of the activities of the Mishap Investigation Team up at Barksdale, I believe. So that'll be following this briefing immediately.

And as for the briefing scheduled that Ron passed on to me, the--we are not going to have any briefings this weekend. The next briefing is planned right now out of NASA headquarters. That's tentative, but that will be on Monday. And then the--I believe the first--the plan for the first full-up-board press briefing, they have talked to you, will be on Tuesday. And I believe that will be from here at the Johnson Space Center. So again, we'll keep you posted on all of that.

And with that, we'll bring this to a close. And I wish everyone a nice weekend. Thank you very much.

END